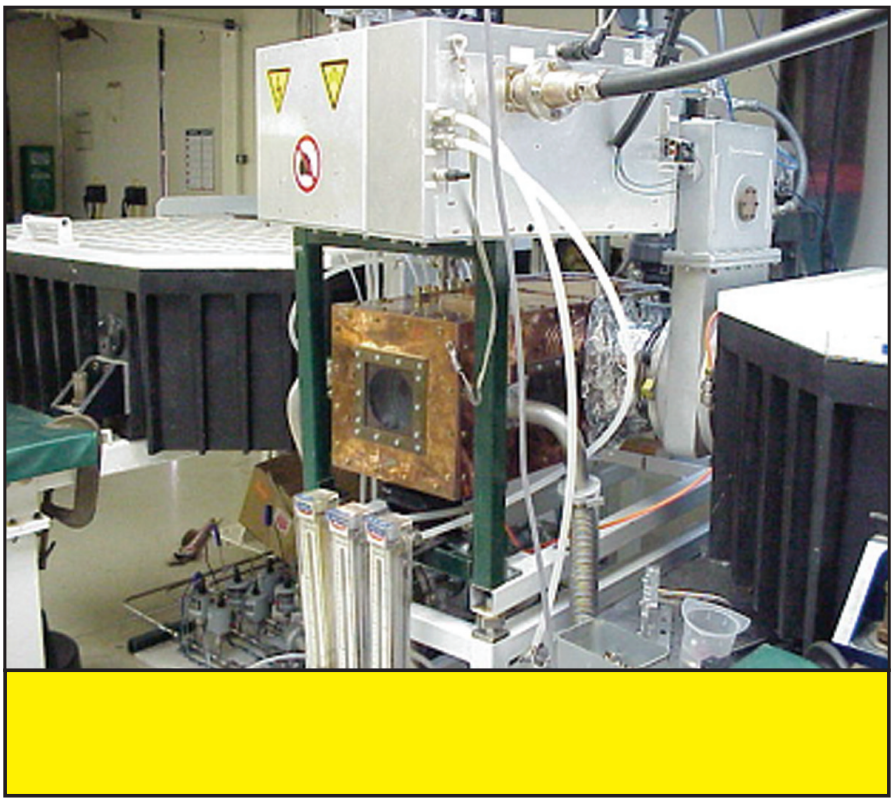
Air Force Research Laboratory | AFRL
*Science and Technology for Tomorrow's Aerospace Forces*

# Success Story

## SUPERSONIC CARBON MONOXIDE OVERTONE LASER



The Directed Energy Directorate's Supersonic Carbon Monoxide (CO) Overtone Laser program addresses the need for high-power 4-micron laser sources. The results of this effort will yield a scalable, frequency-agile device operating between 3.4-4.1 microns, which would make this system an attractive candidate for the Airborne Laser, Space-Based Laser, and Tactical High Energy Laser demonstration projects. Since the pump mechanism is electrical in nature, closed-cycle operation of the CO Overtone Laser would lend itself to a compact, flight-worthy design viable for military applications. This device would also be applicable for remote sensing.

Air Force Research Laboratory
Wright-Patterson AFB OH

## Accomplishment

This research yielded a maximum observed fundamental power (>.5 kW) utilizing a one-pass resonator. It also characterized fundamental band multi-line lasing transitions and demonstrated tunable, single-line lasing on fundamental band transitions.

More importantly, directorate researchers used this system to generate low-power overtone lasing at 2.7 microns. This is the first time researchers demonstrated lasing on CO overtone bands with a radio frequency (RF)-pumped supersonic system, and it was an important first step towards the long-term goal of CO laser output at 4 microns. In addition, the directorate's Chemical Laser Facility (CLF) established a working relationship with the Lebedev Physics Institute in Moscow, currently one of the world's leading authorities on CO lasers, to help accomplish further scientific breakthroughs with this technology.

## Background

The directorate is constantly researching the suitability of laser technology to meet Air Force warfighter requirements. Recent developments with CO lasers show significant potential for their applicability for airborne platforms. The build-up and testing of a supersonic RF-excited CO laser system has been ongoing at the directorate's CLF since 1999.



## Additional information

To receive more information about this or other activities in the Air Force Research Laboratory, contact TECH CONNECT, AFRL/XPTT, (800) 203-6451 and you will be directed to the appropriate laboratory expert. (01-DE-17)